

CLAIMS

1. A fuel cell system comprising:

- a fuel cell for generating power from fuel gas supplied thereto;
- 5 a supply system for supplying fuel gas to the fuel cell;
- a recirculation system for recirculating unused fuel gas from the fuel cell, the fuel gas in the recirculation system containing nitrogen;
- 10 a purge valve for purging nitrogen contained in the fuel gas in the recirculation system; and
- a controller for adjusting a valve opening of the purge valve so that a nitrogen concentration of the fuel gas in the recirculation system is kept constant.

2. The fuel cell system according to claim 1,

- wherein the controller reduces the valve opening of the purge valve if a flow rate of the fuel gas passing through the purge valve is more than a threshold set in accordance with operation conditions of the fuel cell system and the valve opening of the purge valve, and increases the valve opening of the purge valve if the flow rate of the fuel gas passing through the purge valve is less than the threshold.

20 3. The fuel cell system according to claim 2,

- wherein the threshold is set larger as the valve opening of the purge valve becomes larger.

4. The fuel cell system according to claim 2, further comprising:

- 25 a temperature sensor for detecting temperature of the fuel gas passing through the purge valve,
- wherein the threshold is set lower as the temperature of the fuel gas detected by the temperature sensor rises.

30 5. The fuel cell system according to claim 2, further comprising:

a pressure sensor for detecting pressure of the fuel gas in the supply system,
wherein the threshold is set lower as the pressure of the fuel gas detected by the
pressure sensor drops.

5 6. The fuel cell system according to claim 1,

wherein a flow rate of the fuel gas passing through the purge valve is obtained
from a difference between a supply rate of the fuel gas supplied from the supply system
and a consumption rate of the fuel gas consumed by the fuel cell.

10 7. The fuel cell system according to claim 6, further comprising:

an ejector provided in the recirculation system, to which the supply system is
connected; and

a pressure sensor for detecting supply pressure of the fuel gas supplied to the
ejector,

15 wherein the supply rate of the fuel gas is calculated based on the supply
pressure detected by the pressure sensor.

8. The fuel cell system according to claim 7, further comprising:

20 a temperature sensor for detecting a temperature of the fuel gas upstream of the
ejector,

wherein the supply rate of the fuel gas is calculated based on the temperature of
the fuel gas detected by the temperature sensor and the supply pressure thereof detected
by the pressure sensor.

25 9. The fuel cell system according to claim 6, further comprising:

a fuel pressure regulator for the fuel gas supplied to the fuel cell;

a valve opening sensor for detecting a valve opening of the fuel pressure
regulator; and

30 a pressure sensor for detecting pressure of the fuel gas upstream of the fuel
pressure regulator,

wherein the supply rate of the fuel gas is calculated based on the valve opening of the fuel pressure regulator detected by the valve opening sensor, and the pressure of the fuel gas upstream of the fuel pressure regulator detected by the pressure sensor.

5 10. The fuel cell system according to claim 9, further comprising:

a temperature sensor for detecting temperature of the fuel gas upstream of the fuel pressure regulator,

wherein the supply rate of the fuel gas is calculated based on the valve opening

degree of the fuel pressure regulator detected by the valve opening sensor, the pressure

10 of the fuel gas upstream of the fuel pressure regulator detected by the pressure sensor, and the temperature of the fuel gas detected by the temperature sensor.

11. The fuel cell system according to claim 6, further comprising:

an ammeter for detecting an output current of the fuel cell,

15 wherein the consumption rate of the fuel gas is calculated based on the output current detected by the ammeter.

12. The fuel cell system according to claim 6, further comprising:

an ammeter for detecting an output current of the fuel cell; and

20 a pressure sensor for detecting pressure of the fuel gas upstream or downstream of the fuel cell,

wherein the controller is provided with a unit for obtaining a variation rate of the pressure of the fuel gas detected by the pressure sensor, and

25 wherein the consumption rate of the fuel gas is calculated based the output current detected by the ammeter and the variation rate of the pressure of the fuel gas given by the unit of the controller.